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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/771,060

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Gaku Minamihara

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EXAMINER

GOODWIN, DAVID J

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PAPER NUMBER

2818

MAIL DATE

DELIVERY MODE

03/10/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/771,060	Applicant(s) MINAMIHARA ET AL.	
	Examiner DAVID GOODWIN	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/31/08.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (US 2002/0098789) and further in view of Saka (US 6,458,013)

1. Regarding claim 11.

2. Shimagaki teaches a method of polishing a substrate. Said method comprises a pad for use in CMP (column 1 lines 5-15). The polishing process is used on insulating or metallic layers formed on a semiconductor wafer (column 19 lines 20-30). The process comprises. The polishing process uses a polishing slurry (column 13 lines 45-55). Polishing slurries are applied to the surface of the substrate. The pad comprises a resin matrix (column 5 lines 20-35). Further the pad comprises particles of soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60). The amount of soluble material is preferably between 0.5 and 5.0 wt% (column 14 lines 1-5). The material for the polishing pad matrix and the soluble particles have a density of approximately 1 g/cm³ and will therefore result in a soluble particle volume component ranging from 0.5 to 5.0 % of the

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pad total volume. Shimigaki teaches that the polishing slurry may contain abrasive grains (column 13 lines 55-65).

3. In the embodiment Shimigaki does not teach that the polishing pad is placed on a turntable.

4. Shimigaki teaches putting the polishing pad on a turntable (column 19 lines 50-55)

5. It would have been obvious to one of ordinary skill in the art to put the polishing pad on a turn table so that it can be used to polish.

6. Shimigaki does not teach the size of the eluting particles.

7. Burke teaches a method of making a semiconductor device. Said method comprising a polishing pad being used to apply abrasive slurries to the substrate (paragraph 34). Said pad comprising a matrix (11) having cells (14) recessed into the matrix (11) dispersed across a surface region of the polishing pad (fig 3) (paragraph 36). Each cell is formed by the liberation of a particle from the matrix leaving a void with a size ranging from 5 to 250 microns (paragraph 51) thereby forming a surface having a microtexture of 1-5 microns (paragraph 35).

8. It would have been obvious to one of ordinary skill in the art to use particles of 5 to 250 microns in order to transfer sufficient slurry across the surface of the substrate.

3. Shimigaki in view of Burke does not teach the compression elastic modulus of the pad.

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4. Saka teaches a polishing pad having a compression elastic modulus of between 300 and 600 Mpa (column 11 lines 55-60). Further, compression modulus is a property of the material used and does not depend on the location of the pad.

5. It would have been obvious to one of ordinary skill in the art to use an eluting polishing pad having a compression elastic modulus of 500 Mpa in order that it has sufficient strength to maintain its form during processing and reduce dishing but is not so hard as to risk scratching the substrate to be polished. Further, such pads are used in the art and would therefore be obvious to try.

9. Regarding claim 20.

10. Shimagaki teaches further that the pad comprises particles of water soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60).

11. Claims 12 through 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Saka (US 6,458,013) as applied to claim 11 and further in view of You (US 6,663,787 B1).

12. Regarding claim 12.

13. Shimigaki in view of Burke in view Saka teaches elements of the claim invention above in the rejection of claim 11.

14. Shimagaki in view of Burke in view of Saka does not teach that the polishing pad may be used to polish a conductive layer formed over an insulating layer.

15. You teaches a method of making a semiconductor device using a copper damascene method. Said method comprising depositing a first insulating layer (142) forming a second insulating layer (113) over the first insulating layer (142) (fig 5d) (column 18 lines 15-45). Forming a recess (146) in the insulating layers (fig 5g) (column 19 lines 10-30). Depositing a conductive layer (122) over the insulating layers (fig 5k) (column 20 lines 20-40). Polishing the conductive layer to form a wiring layer (fig 5L) (column 20 lines 40-55).

16. It would have been obvious to use the polishing pad and process of Shimigaki in view of Burke in view Saka to polish the conductive layer of You in order to get a highly planar surface.

17. Regarding claim 13.

18. You further teaches the use of copper as the conductive layer to be polished (column 20 lines 20-40).

19. It would have been obvious to use copper as the conductive layer in order to get a highly conductive metallization.

20. Regarding claims 14, 15, and 16.

21. You further teaches the use of silicon nitride as the second layer (column 18 lines 50-60) and polyaryl ether as the first layer (column 18 lines 5-10). Polyaryl ether has a dielectric constant of less than 2.5 and silicon nitride has a dielectric constant higher than polyaryl ether.

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22. It would have been obvious to one of ordinary skill in the art to use silicon nitride over polyaryl ether in order to minimize the intermetal insulator dielectric constant and protect the low dielectric constant intermetal dielectric from polishing damage.

23. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Saka (US 6,458,013) as applied to claim 11 and further in view of Jang (US 5,702,977).

24. Shimagaki in view of Burke in view of Saka teaches elements of the claimed invention above in the rejection of claim 11

25. Shimagaki in view of Burke in view of Saka does not teach the use of the polishing to polish an insulator deposited in a trench.

26. Jang teaches a method of making a semiconductor device. Said method comprises providing a semiconductor substrate (30) (column 5 lines 45-55). Forming a trench (29) in the semiconductor (30) (fig 3) (column 5 lines 50-65). Depositing an insulating layer (42) over the trench (29) and substrate (30) (column 9 lines 45-55). Polishing the insulating layer to form a patterned buried insulating region (42b) (fig 8) (column 10 lines 30-45).

27. It would have been obvious to use the polishing pad and process of Burke to polish the insulating layer of Jang in order to get a highly planar surface.

28. Regarding claim 18.

29. Jang teaches that the insulating layer (42) comprises silicon dioxide (column 9 lines 55-65).

30. It would have been obvious to one of ordinary skill in the art to use silicon dioxide for the insulating layer formed in the trench because it provides adequate isolation in an efficient process.

Response to Arguments

31. The applicant has amended the claims to state that the polishing pad has modulus of elasticity of 300 to 600 MPa while on a turntable. The only support that the polishing pad has modulus of elasticity of 300 to 600 MPa while on a turntable arises from the modulus of elasticity being an inherent property of the material not dependent on the location of the polishing pad.

32. Should the applicant argue that the modulus of elasticity being between 300 and 600 MPa while on the turntable is not inherent then there will be no support in the application as originally filed for the polishing pad having a modulus of elasticity of 300 to 600 MPa while on a turntable. This will result in all claims being rejected under 35 USC 112, first paragraph, for incorporating new matter.

33. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

34. If the applicant chooses the position that the property is not inherent than claims 11 through 18 and 20 are rejected under 36 USC 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to

one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

35. Applicant's arguments filed 1/31/08 have been fully considered but they are not persuasive.

36. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art to combine the references in order that it has sufficient strength to maintain its form during processing and reduce dishing but is not so hard as to risk scratching the substrate to be polished. Further, such pads are used in the art and would therefore be obvious to try.

37. The applicant argues that the prior art does not teach that the particle occupy 0.1 to 5%.

38. The applicant is incorrect. Shimagaki teaches the amount of soluble material is preferably between 0.5 and 5.0 wt% (column 14 lines 1-5). The material for the polishing pad matrix and the soluble particles have a density of approximately 1 g/cm³ and will therefore result in a soluble particle volume component ranging from 0.5 to 5.0 % of the pad total volume.

39. The applicant argues that the prior art does not teach an elastic modulus of between 300 and 600 MPa.

40. However, as the applicant notes Saka teaches an compression elastic modulus of 500 Mpa. 500 Mpa is between 300 and 600 MPa.

41. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

42. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID GOODWIN whose telephone number is (571)272-8451. The examiner can normally be reached on Monday through Friday, 9:00am through 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on (571)272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJG

/Steven Loke/
Supervisory Patent Examiner, Art Unit 2818

<div>Application Number</div> <div></div>	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/771,060	MINAMIHARA ET AL.	
	Examiner	Art Unit	
	DAVID GOODWIN	2818	